

Citation:

Erik Landhuis C, Poulton R, Welch D, Hancox RJ. Programming obesity and poor fitness: the long-term impact of childhood television. *Obesity* (Silver Spring). 2008 Jun;16(6):1457-9.

PubMed ID: [18369346](#)

Study Design:

prospective cohort study

Class:

B - [Click here](#) for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To assess whether the long-term effects of childhood television viewing on BMI and cardiorespiratory fitness are mediated by adult viewing.

Inclusion Criteria:

none listed

Exclusion Criteria:

none listed

Description of Study Protocol:**Recruitment**

- Children born in Dunedin, New Zealand between April 1972 and March 1973.

Design

- Prospective cohort study

Blinding used

- Implied for anthropometric and exercise measurements.

Intervention (if applicable)

- No intervention.
- Assessments were made at ages 3, 5, 7, 9, 11, 13, 15, 18, 21, 26 and 32 years.
- Effects on BMI and VO_{2max} were evaluated by: 1) childhood viewing (age 5-15) versus

adult viewing (age 32); and then childhood viewing (age 5-15); adult viewing (age 32); and then by developmental epoch (age 5-11 and age 13-15 versus age 32).

Statistical Analysis

- Associations between television viewing and BMI and $VO_{2\max}$ at age 32 were assessed using multiple linear regression.
- Childhood and adult television viewing were first analyzed separately.
- Then both viewing variables were entered into the model to evaluate their relative contributions.
- Logistic regression analyses examined associations between television viewing and obesity and poor fitness.
- Obesity was defined as BMI of 30 kg/m^2 or greater.
- $VO_{2\max}$ values were divided into sex-specific quartiles with the lowest quartile defined as poor fitness.
- Pregnant women ($n=31$) were excluded from the analyses.
- All analyses adjusted for sex.
- Sex interaction terms were not significant in any of the models.

Data Collection Summary:

Timing of Measurements

- Baseline measurements taken at age 3.
- From ages 5-11, parents were asked how long their children spent watching television on weekdays.
- At ages 13, 15 and 32, study members themselves were asked how long they usually spent watching television on weekdays and weekends.

Dependent Variables

- BMI
- Fitness ($VO_{2\max}$) was assessed using a cycle ergometer in a submaximal exercise test.

Independent Variables

- Television viewing at various ages.

Control Variables

- Childhood socioeconomic status was assessed using parent's occupational status. Occupations were coded based on educational level and income.
- Early BMI measured at 5 years.
- Parental BMI.

Description of Actual Data Sample:

Initial N:

- 1,037 children (91% of eligible children; 535 men) participated in the first follow-up assessment at age 3 years.

Attrition (final N):

- At age 32 years, 972 (96%) of 1,015 living study members were assessed.
- Thirty-one pregnant women were excluded from the analyses.

Age: from 3 to 32 years

Ethnicity: not given

Other relevant demographics: not given

Anthropometrics

- BMI was used as a dependent variable and varied from 3 to 32 years.

Location:

- Dunedin, New Zealand

Summary of Results:**Key Findings:**

- Mean (s.d.) reported weekday viewing times were 2.33 (0.88) h during childhood and 1.92 (1.35) h at age 32.
- Childhood weekday television viewing was correlated with adult weekday viewing ($r = 0.33$, $P < 0.001$).
- Mean BMI and $VO_{2\max}$ at age 32 were 25.9 (5.6) kg/m^2 and 26.5 (5.5) l/min/kg for women and 26.4 (4.3) kg/m^2 and 39.5 (6.6) l/min/kg for men.
- Analyzed separately, childhood and adult viewing each predicted higher BMI and lower $VO_{2\max}$ at age 32.
- These associations remained after controlling for the possible confounding effects of childhood socioeconomic status, early BMI, and parental BMI.
- When childhood and adult viewing were entered into the regression model simultaneously, childhood television viewing remained as a significant predictor of BMI and $VO_{2\max}$ at age 32.
- Findings were similar when viewing epochs were examined by viewing at ages 5-11 and 13-15 years.
- By logistic regression, childhood viewing predicted both adult obesity (odds ratio; 95% confidence interval for each hour of mean childhood viewing = 1.3; 1.07, 1.58) and adult poor fitness (odds ratio = 1.41; 1.17, 1.69).
- Childhood viewing remained a significant predictor of obesity (odds ratio = 1.25; 1.01, 1.53) and poor fitness (odds ratio = 1.40; 1.16, 1.70) after controlling for adult viewing.

Author Conclusion:

- The association between childhood viewing and obesity and poor fitness in adulthood is not mediated by adult viewing.
- The detrimental health effects of watching too much television during childhood persist into adulthood.
- Attempts to reduce adult obesity and poor fitness by modifying television viewing habits need to begin in childhood.

Limitations as addressed by the authors.

- Measure of childhood television viewing (multiple assessments over a 10-year period) may be a better representation of television viewing than the single adult viewing measure. Therefore the authors repeated the analyses for reported television viewing at each assessment between ages 5 and 15 and found the same general pattern, with television viewing time reported at ages 9, 11, 13 and 15 each predicting adult BMI, after controlling for adult viewing.
- No estimates of weekend viewing from ages 5 to 11 and were unable to assess the effects of total viewing time at these ages.

Reviewer Comments:

A long term cohort study with good retention. The authors adequately addressed limitations.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

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| 1. | Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies) | Yes |
| 2. | Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about? | Yes |
| 3. | Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice? | Yes |
| 4. | Is the intervention or procedure feasible? (NA for some epidemiological studies) | Yes |

Validity Questions

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|------|---|-----|
| 1. | Was the research question clearly stated? | Yes |
| 1.1. | Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified? | Yes |
| 1.2. | Was (were) the outcome(s) [dependent variable(s)] clearly indicated? | Yes |
| 1.3. | Were the target population and setting specified? | Yes |
| 2. | Was the selection of study subjects/patients free from bias? | No |
| 2.1. | Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study? | No |

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|-----------|--|-----|
| 2.2. | Were criteria applied equally to all study groups? | ??? |
| 2.3. | Were health, demographics, and other characteristics of subjects described? | No |
| 2.4. | Were the subjects/patients a representative sample of the relevant population? | ??? |
| 3. | Were study groups comparable? | Yes |
| 3.1. | Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT) | N/A |
| 3.2. | Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline? | N/A |
| 3.3. | Were concurrent controls used? (Concurrent preferred over historical controls.) | N/A |
| 3.4. | If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis? | Yes |
| 3.5. | If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.) | N/A |
| 3.6. | If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")? | N/A |
| 4. | Was method of handling withdrawals described? | Yes |
| 4.1. | Were follow-up methods described and the same for all groups? | N/A |
| 4.2. | Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.) | Yes |
| 4.3. | Were all enrolled subjects/patients (in the original sample) accounted for? | Yes |
| 4.4. | Were reasons for withdrawals similar across groups? | N/A |
| 4.5. | If diagnostic test, was decision to perform reference test not dependent on results of test under study? | N/A |
| 5. | Was blinding used to prevent introduction of bias? | Yes |
| 5.1. | In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate? | N/A |

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| 5.2. | Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.) | Yes |
| 5.3. | In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded? | Yes |
| 5.4. | In case control study, was case definition explicit and case ascertainment not influenced by exposure status? | N/A |
| 5.5. | In diagnostic study, were test results blinded to patient history and other test results? | N/A |
| 6. | Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described? | Yes |
| 6.1. | In RCT or other intervention trial, were protocols described for all regimens studied? | N/A |
| 6.2. | In observational study, were interventions, study settings, and clinicians/provider described? | Yes |
| 6.3. | Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect? | Yes |
| 6.4. | Was the amount of exposure and, if relevant, subject/patient compliance measured? | Yes |
| 6.5. | Were co-interventions (e.g., ancillary treatments, other therapies) described? | N/A |
| 6.6. | Were extra or unplanned treatments described? | N/A |
| 6.7. | Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups? | N/A |
| 6.8. | In diagnostic study, were details of test administration and replication sufficient? | N/A |
| 7. | Were outcomes clearly defined and the measurements valid and reliable? | Yes |
| 7.1. | Were primary and secondary endpoints described and relevant to the question? | Yes |
| 7.2. | Were nutrition measures appropriate to question and outcomes of concern? | Yes |
| 7.3. | Was the period of follow-up long enough for important outcome(s) to occur? | Yes |
| 7.4. | Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures? | Yes |
| 7.5. | Was the measurement of effect at an appropriate level of precision? | Yes |
| 7.6. | Were other factors accounted for (measured) that could affect outcomes? | Yes |
| 7.7. | Were the measurements conducted consistently across groups? | Yes |

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| 8. | Was the statistical analysis appropriate for the study design and type of outcome indicators? | Yes |
| 8.1. | Were statistical analyses adequately described and the results reported appropriately? | Yes |
| 8.2. | Were correct statistical tests used and assumptions of test not violated? | Yes |
| 8.3. | Were statistics reported with levels of significance and/or confidence intervals? | Yes |
| 8.4. | Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)? | N/A |
| 8.5. | Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)? | Yes |
| 8.6. | Was clinical significance as well as statistical significance reported? | Yes |
| 8.7. | If negative findings, was a power calculation reported to address type 2 error? | N/A |
| 9. | Are conclusions supported by results with biases and limitations taken into consideration? | Yes |
| 9.1. | Is there a discussion of findings? | Yes |
| 9.2. | Are biases and study limitations identified and discussed? | Yes |
| 10. | Is bias due to study's funding or sponsorship unlikely? | Yes |
| 10.1. | Were sources of funding and investigators' affiliations described? | Yes |
| 10.2. | Was the study free from apparent conflict of interest? | Yes |

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